formed into fibrous tissue without a trace of muscular element. The nerve trunks at the first glance seemed healthy enough, but, upon section, the degeneration was observed to be complete, and they were almost like empty tubes. In the spine below the first dorsal vertebra no change was observed, but at the level of the first dorsal and of the eighth cervical, there was a diminution in the size of the right anterior cornu, and a great decrease in the number of cells in this column. At the level of the seventh cervical, there was complete disappearance of the stellate cells of the anterior horn. Above this, the structure again became healthy; there was no sign of sclerosis or of inflammatory processes. The white substance displayed no change nor the bulb and protuberance. In the left hemisphere of the cerebrum the ascending frontal convolution was considerably lessened in size, being only about half as deep as that of the opposite side. No sign of disease could be found, the condition being simply one of atrophy. The atrophy of these centers cannot be considered as due to an ascending degeneration at all, but simply as an atrophy from loss of function of an organ, favored by the age at which the injury to the arm took place.

MITCHELL.

46. CEREBELLAR LOCALIZATION. J. S. Risien Russell (Clinical Journal, 13, 1898, p. 5.)

Within the last six or eight years no one has done more to advance our knowledge of the cerebellum than has the above author, and many of the practical results of his investigations are epitomized in this lecture.

Clinically, cerebellar localization is one of the most perplexing problems that confront the diagnostician. Besides the difficulties inseparable from incomplete knowledge of this part of the brain, there is an added element of uncertainty in the fact that in cerebellar lesions in man we have, as a rule, to deal not only with defects consequent on destruction of cerebellar tissue, and which are strictly comparable to the effects which follow ablation of parts of the organ experimentally, but also with others the result of increase of intra-cranial pressure. The effect of increase of intra-cranial pressure is to distort the clinical picture by adding to it extraneous phenomena in no way dependent on the destruction of cerebellar tissue. This increase of pressure, however, oftentimes responsible for so much confusion, is not entirely an unmixed evil, but under certain circumstances some of its effects are important aids to diagnosis. The present lecture concerns only the signs which indicate the existence of a lesion of one lateral lobe, exclusive of involvement of the middle lobe.

Inco-ordination is the most striking feature noted after experimental ablation of one-half of the organ, and manifests itself in various ways.

Rotation:—At first all other modes of its manifestation may be subservient to rotation, the direction of which is best described in terms relating to a screw. In a right-sided lesion the rotation of a subject is in the direction of a right-handed male screw entering an object, while in a left-sided lesion the direction of rotation corresponds to that of a similar screw coming out of an object. This phenomenon does not always occur after experimental lesions, and is only exceptionally met with in man, a fact that is not surprising in that it is much less pronounced in the monkey than in the dog.

Titubation is always obvious when the tendency to rotation is sufficiently in abeyance to make sitting up or standing possible. The unsteadiness of the head on the trunk resembles closely that seen in disseminated sclerosis, and is increased by any attempt at voluntary movement, e. g., feeding. This phenomenon may be well marked in clinical cases, but not so much so as inco-ordination or ataxy of the limbs best seen in the disturbance of the gait of man. The subject walks with the lower extremities far apart, on a wide base, moving the limbs forward in an unsteady manner, it may be tending to stamp the heels unduly, and evincing more inco-ordination of the limb on the side of the cerebellar lesion than of that on the opposite side. Oftentimes this difference is only very slight in degree, and will only be appreciated on most careful observation. Similarly, the inco-ordination may sometimes be demonstrated as the patient lies in bed and will be present in the upper as well as in the lower extremities, and more marked on the side of the lesion. Both the unsteadiness which is seen most typically in multiple sclerosis, and the ataxia with loss of sense of position that is best marked in tabes, may be evident on both sides or confined to the side of the lesion. When the defect in the upper extremity is very slight the test should be made with the whole arm, i. e., with the upper arm held by the patient at a right angle to the trunk.

Reeling is another phenomenon which is much more constant as a result of experimental lesions than as one of the effects of cerebellar disease in man, and, moreover, while its direction indicates with great certainty the side of the experimental lesion, few of the signs on which we rely for the localization of the seat of disease clinically are less reliable than is this one. Experimentally the subject reels so as to fall away from the side of the lesion, but clinically we sometimes find the patient reeling to the side of the lesion, while in other instances he reels to the opposite side, as in the case of the experimental lesions. This difference, no doubt, depends in some way on the increased intracranial pressure present in addition to the destructive lesion of the cerebellum in most of the cases met with clinically. In attempting to localize a cerebellar lesion the observer should not be influenced by the side to which the patient lurches or tends to fall, unless this sign is in accord with the other phenomena present on which a diagnosis is being based. Where other signs present point to one side of the cerebellum being affected, while the direction of the reeling indicates the other, it is better to disregard the latter sign, and to be guided by the indications which the others afford.

The attitude is very characteristic. The trunk is curved with the concavity to the side of the cerebellar lesion, and the side of the face is approximated to the shoulder on the same side; but in addition to this, in animals, there is a curious rotation of the neck, so that the side of the face corresponding to the cerebellar lesion is turned upwards, and at the same time the chin is directed to the affected side. There has been this difference, however, in the attitude in the cases in which one has seen this sign in man, as compared to what one has found in animals—the chin appears to be directed to the opposite side instead of to the side of the lesion. Otherwise the attitude is the same as after experimental lesions; there is the same lateral inclination of the head to the side of the lesion, so that the side of the face is approximated to the shoulder, and there is the same lateral curvature of the spinal column with the concavity of the curve to the side of the lesion.

A one-sided lesion of the cerebellum may cause rigidity and convulsions limited to muscles on the same side as the lesion, but these symptoms are not of great practical value because their occurrence is comparatively rare and because a lesion such as tumor which may cause pressure on the pons may, because of such pressure, cause rigidity and spasm on the side opposite to the lesion or on both sides of the body.

The tendon-jerks furnish one of the most striking differences of what obtains in man as opposed to the experimental results in animals. In the latter the tendon-jerks are increased; and while this is true of both knee-jerks, that on the side of the lesion is the more exaggerated. Though a similar state of things is met with in man in some instances, in others there may be no difference on the two sides, while in others both knee-jerks are abolished.

Immediately after the operation of removal of one lateral half of the cerebellum the knee-jerk on the side of the lesion is much increased, while that on the opposite side is greatly diminished, if not abolished. By the following day the diminished knee-jerk of the opposite side to the lesion becomes exaggerated, and by the second day it may be impossible to say which of the knee-jerks is the greater. As time goes on, however, the knee-jerks become less and less active, that on the side of the lesion always remaining brisker than normal as long as the subjects were kept under observation (three months), while the knee-jerk on the opposite side usually returned to or about normal, so that at this late stage it is usually possible to determine inequality of the knee-jerks, that on the side of the lesion being increased and greater than that on the opposite side.

That increased activity of the knee-jerks may persist for a long time after a cerebellar lesion is recovered from in man was well illustrated by a case in which Mr. Dean successfully evacuated an abscess in the right side of the cerebellum, for both knee-jerks remained exceedingly active two years and a half after the operation; but Mr. Dean was unable to decide which of the two jerks was the more increased.

As has already been said, while exaggeration of the knee-jerks occurs in cerebellar disease of man, it is as common to find them diminished or abolished. This diminution or abolition of the knee-jerks in cases of cerebellar tumor in man must in some way be associated with the increase of intra-cranial pressure present in these cases. This is suggested by the following two considerations: In the first place, in experimental lesions in animals where pressure is out of the question, apart from the temporary depression of the knee-jerk on the side opposite to a unilateral lesion of the cerebellum, the rule is, as we have seen, that the knee-jerks are increased. Secondly, tumors of the cerebral hemispheres attended with great increase of intra-cranial pressure, especially if the pressure be rapidly increased, may show great diminution or absence of knee-jerks, just as in these cerebellar cases that we are now considering. Moreover, where diminution or abolition of the knee-jerks is met with, variations in their exact state of activity from time to time not uncommonly occur.

Motor paresis is constantly met with in slight degree experimentally, but is only to be detected exceptionally in man. It assumes the form of a hemiplegia in which the limbs on the side of the lesion are affected and the face escapes; or perhaps it would be more correct to speak of it as a triplegia, in that experimentally a slight degree of paresis is also present in the posterior limb of the opposite side. Apart from the fact that this motor paresis is only exceptionally met with in man, while it is a constant phenomenon after experimental lesions, another notable difference exists between the quadruped and man, in that it appears to be the posterior extremity on the side of the lesion that suffers most in the former, while it is the superior extremity on the side of the lesion in which the paresis has been most evident in cases of the kind which have come under the author's observation in man.

Ocular defects are constant in experimental work, the most constant being a turning outward and downward of the eye on the side opposite to the lesion. Clinically, this variety of squint is rarely met with, but the author has seen it in cases both of tumor and of abscess of the cerebellum. In consequence of the increase of intra-cranial pressure, ocular paralyses are frequent in cerebellar tumor and may be very confusing if their true significance be not recognized. The opposite sixth nerve appears more prone to suffer from pressure in these cases than is the corresponding nerve on the side of the cerebellar disease, so that weakness of the external rectus of the opposite eye may be present, and the globe may accordingly turn more or less inward, i. e., to the side of the cerebellar lesion. This phenomenon has been responsible for errors in localization, owing to its being assumed that the sixth nerve on the side of the cerebellar disease is more likely to suffer from pressure than is its fellow on the opposite side, so that weakness of one external rectus has been taken to mean that the tumor (the most common condition present in these cases) is situated on the same side of the cerebellum.

Another ocular defect which is of great importance in the localization of cerebellar lesions is nystagmus, either spontaneous or evoked when the eyes are moved from their resting position. When the nystagmus is associated with ocular displacements consequent on pressure on one or other of the nerves which supply the muscles of the eyeballs, the special features which characterize nystagmus, the direct result of the destruction of one-half of the cerebellum, can, as a rule, no longer be recognized. Where no ocular displacement occurs at all or where the displacement met with is that characteristic of ablation of one-half of the organ, and where it is not necessary to invoke secondary pressure on any of the ocular nerves to account for the condition, the nystagmus has very special characters which it is important to recognize. In the first place the nystagmus is lateral; and in the next place when not present spontaneously it may not be evoked at all, or only in slight degree when the globes are voluntarily directed away from the side of the lesion, whereas it is pronounced when the eyes are voluntarily turned to the side of the lesion, i. e., in the direction opposite to that in which the opposite globe is displaced as a direct result of the unilateral ablation of the cerebellum. If spontaneous nystagmus exists, voluntary turning of the eyes to the side of the lesion intensifies it, and the nystagmus may become coarser, the range of movement of the globes becoming greater. PATRICK.

47. CASUISTISCHE BEITRÄGE ZUR HIRNCHIRURGIE UND HIRNLOCALISATION (Clinical Contributions to Cerebral Surgery and Cerebral Localization). H. Liepmann (Monatsschrift für Psychiatrie und Neurologie, Vol. 3, 1898, p. 407).

Liepmann reports a case of crural monoplegia and convulsions. Trephining failed to reveal the tumor, supposed to be in the leg center. The convulsions had existed for ten years, but a number of cases have shown that these may precede the other symptoms of tumor by many years. Inasmuch as the leg was already paralyzed, it was determined to cut the fibers from the leg center, in order to prevent the convulsions. A cut was made about three fingers' breadth from the median line, an inch deep, and at an angle of about 45 degrees to the sagittal plane. The convulsions did not return during the first five months following the operation, and later were infrequent, but the entire left side of the body was paralyzed. After a time the paralysis became partial and limited to the arm and leg. The senses of position, movement and touch in the arm were so disturbed that the limb was useless. The upper branch of the facial was also paralyzed for a week. No voluntary movement of one side of the face was possible, yet in laughing and crying paralysis of the facial muscles could not be seen. Immobility